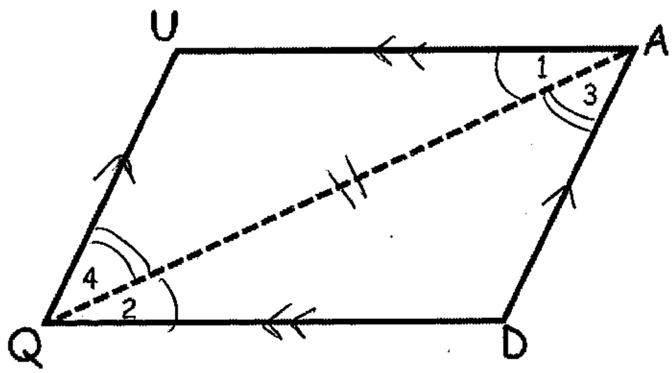
Ia.

Given: QUAD is a parallelogram. Prove: $\overline{QU} \cong \overline{AD}$; $\overline{UA} \cong \overline{DQ}$

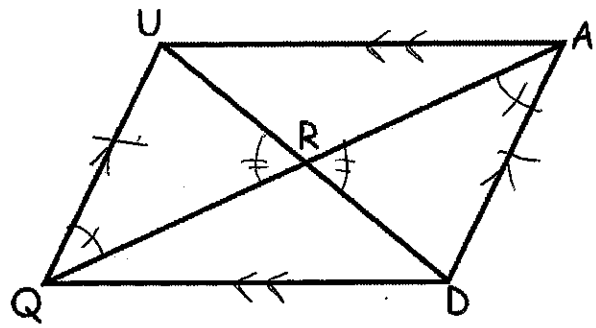


Answer Key

Statement	Reason
1. QUAD is a parallelogram	1. Given
2. $\overline{QU} \parallel \overline{DA}$; $\overline{AU} \parallel \overline{DQ}$	2. Definition of parallelogram
3. $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$	3. If 2 parallel lines are cut by a transversal, the alternate interior angles are congruent.
4. $\overline{QA} \cong \overline{QA}$	4. Reflexive Property
5. $\triangle QUA \cong \triangle ADQ$	5. ASA Postulate
6. $\overline{QU} \cong \overline{AD}$; $\overline{UA} \cong \overline{DQ}$	6. CPCTC

Therefore, opposite sides of a parallelogram are congruent.

Ib



Answer Key

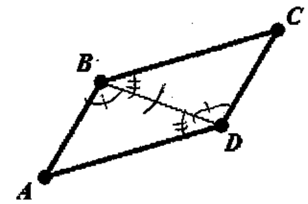
Given: QUAD is a parallelogram

Prove: $\overline{UR} \cong \overline{DR}, \overline{QR} \cong \overline{AR}$

Statements	Reasons
1. QUAD is a parallelogram	1. Given
2. $\overline{QU} \parallel \overline{DA}, \overline{QD} \parallel \overline{UA}$	2. definition of parallelogram
3. $\angle UQR \cong \angle DAR$	3. alternate interior angles are $\cong$
4. $\overline{QU} \cong \overline{AD}$	4. Opposite sides of a parallelogram are $\cong$
5. $\angle URQ \cong \angle DRA$	5. Vertical angles are $\cong$
6. $\triangle QUR \cong \triangle ADR$	6. AAS Postulate
7. $\overline{UR} \cong \overline{DR}$, $\overline{QR} \cong \overline{AR}$	7. CPCTC

Therefore, the diagonals of a parallelogram bisect one another.

Ic



~~Giv~~	Reasons
1. ABCD is a parallelogram	1. Given
2. $\overline{AB} \parallel \overline{CD}$, $\overline{BC} \parallel \overline{DA}$	2. def. of parallelogram
3. $\angle ABD \cong \angle CDB$, $\angle ADB \cong \angle CBD$	3. alt. int. $\measuredangle$s are $\cong$
4. $\overline{BD} \cong \overline{BD}$	4. Reflexive Property
5. $\triangle ABD \cong \triangle CDB$	5. ASA
6. $\angle A \cong \angle C$	6. CPCTC

From here ….

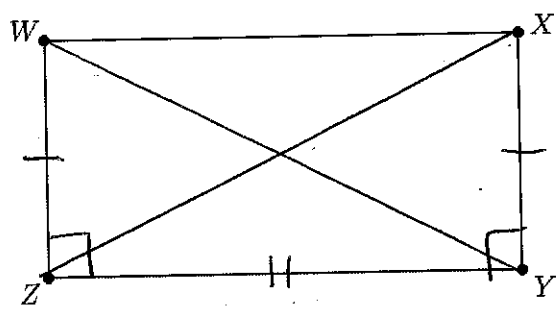
① you could draw in a diagonal from A to C and follow the same steps for the two triangles $\overline{AC}$ would create

OR

② you could use angle addition to show that $\angle B \cong \angle D$

Id

Statements	Reasons
1. WXYZ is a rectangle	1. Given
2. $\overline{WZ} \cong \overline{XY}$	2. opposite sides of a parallelogram are congruent
3. $\overline{ZY} \cong \overline{ZY}$	3. Reflexive Property
4. $\angle WZY$ + $\angle XYZ$ are right angles	4. def. of rectangle
5. $\angle WXY \cong \angle XYZ$	5. all right angles are $\cong$
6. $\triangle WYZ \cong \triangle XZY$	6. SAS
7. $\overline{WY} \cong \overline{XZ}$	7. CPCTC



WLPCS
Geometry

Ie

Name: Answer Key Date: ________ Per.: ______

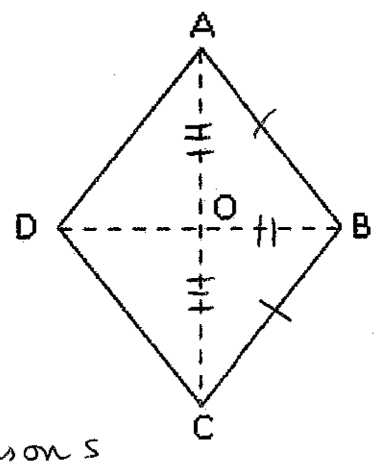
Homework: Parallelogram Proofs Part 2

Proof of Theorem: If a parallelogram is a rhombus, then the diagonals are perpendicular.

*You may use the following pieces of information…
1. A rhombus is a parallelogram with four congruent sides (by definition)
2. A parallelogram contains opposite sides that are parallel to each another (by definition)
3. Diagonals of a parallelogram bisect each other (we've proved this theorem so we can use it!)

Given: $ABCD$ rhombus

Prove: $\overline{AC} \perp \overline{BD}$



Statements	Reasons
1. ABCD is a rhombus	1. Given
2. $\overline{AB} \cong \overline{CB}$	2. Def. of rhombus
3. $\overline{BO} \cong \overline{BO}$	3. Reflexive Prop.
4. $\overline{AO} \cong \overline{CO}$	4. diagonals of a rhombus bisect each other
5. $\triangle ABO \cong \triangle CBO$	5. SSS
6. $\angle AOB \cong \angle COB$	6. CPCTC
7. $m\angle AOB + m\angle COB = 180^\circ$	7. angle addition / def. of supplementary angles
8. $\angle AOB$ and $\angle COB$ are right angles	8. Congruent supplementary angles are right angles!
9. $\overline{AC} \perp \overline{BD}$	9. Def. of $\perp$

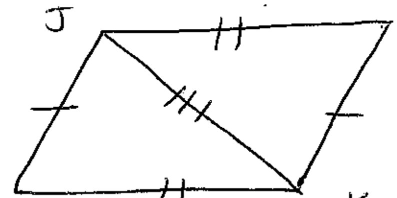
WLPCS
Geometry

Answer Key

IIa

With a partner:

2. Given: Quadrilateral AJSK; $\overline{AJ} \cong \overline{KS}$; $\overline{JS} \cong \overline{AK}$
Prove: AJSK is a parallelogram



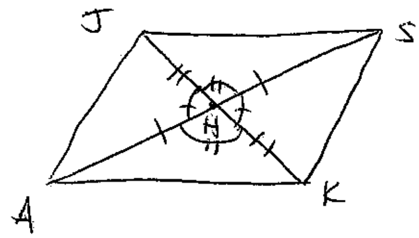
Statements	Reasons
1. $\overline{AJ} \cong \overline{KS}$	1. Given
2. $\overline{JS} \cong \overline{AK}$	2. Given
3. $\overline{AS} \cong \overline{AS}$	3. Reflexive Prop.
4. $\triangle AJK \cong \triangle SKJ$	4. SSS
5. $\angle AJK \cong \angle SKJ$	5. CPCTC
6. $\overline{AJ} \parallel \overline{SK}$	6. converse of alt. int. ∡s theorem
7. $\angle JKA \cong \angle KJS$	7. CPCTC
8. $\overline{JS} \parallel \overline{KA}$	8. converse of alt. int. ∡s theorem
9. AJSK is a parallelogram	9. def. of parallelogram

WLPCS
Geometry

Solo:

II b

3. Given: Quadrilateral AJSK; $\overline{AS}$ and $\overline{JK}$ bisect each other
Prove: AJSK is a parallelogram



Statements	Reasons
1. $\overline{AS}$ and $\overline{JK}$ bisect each other	1. Given
2. $\overline{AH} \cong \overline{HS}$, $\overline{JH} \cong \overline{HK}$	2. def. of bisector
3. $\angle JHA \cong \angle KHS$.	3. vertical angles are $\cong$
4. $\triangle JHA \cong \triangle KHS$	4. SAS
5. $\angle AJK \cong \angle SKJ$	5. CPCTC
6. $\overline{AJ} \parallel \overline{SK}$	6. converse of alt. int. $\angle$s theorem
7. $\angle JHS \cong \angle KHA$	7. vertical angles are $\cong$
8. $\triangle AHK \cong \triangle SHJ$	8. SAS
9. $\angle HKA \cong \angle HJS$	~~8.~~ 9. CPCTC
10. $\overline{AK} \parallel \overline{SJ}$	10. converse of alt. int. $\angle$s theorem
11. AJSK is a parallelogram	11. def. of parallelogram

WLPCS
Geometry

II C

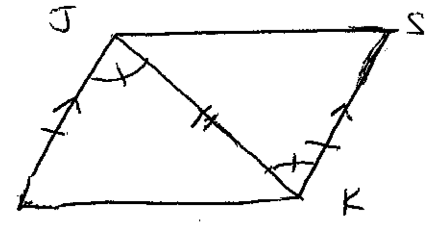
Answer Key

Name: ______________________ Date: ____________ Per.: ________

4.5: Proving Quadrilaterals Are Parallelograms

Together:

1. Given: Quadrilateral AJSK; $\overline{AJ} \parallel \overline{KS}$; $\overline{AJ} \cong \overline{KS}$
Prove: AJSK is a parallelogram



Statements	Reasons
1. $\overline{AJ} \parallel \overline{KS}$	1. Given
2. $\overline{AJ} \cong \overline{KS}$	2. Given
3. $\overline{JK} \cong \overline{JK}$	3. Reflexive Property
4. $\angle AJK \cong \angle SKJ$	4. alt. int. ∡s are ≅
5. $\triangle AJK \cong \triangle SKJ$	5. SAS
6. $\angle JKA \cong \angle KJS$	6. CPCTC
7. $\overline{JS} \parallel \overline{AK}$	7. Converse of alt. int. ∡s theorem
8. AJSK is a parallelogram	8. def. of parallelogram